

Case report

## Wounds inflicted by survival-knives

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### Abstract

A homicidal fatality is presented to demonstrate that the pattern of injuries may suggest the use of an unusual sharp force, a survival-knife, the characteristics of which are in any case well defined. This knife has saw teeth along the back that can leave characteristic scrape marks on the skin. © 2002 Elsevier Science Ireland Ltd. All rights reserved.

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### 1. Introduction

Sharp force violence is by far one of the most common ways of committing murder, although in the last few years Italian case registries have shown a decrease. The fact that their use is not controlled by specific legislation and that they are easily available in daily life make steel weapons the ones most commonly used in street violence and in “spur of the moment” crimes. However, it is possible for the weapon to be used intentionally, perhaps with a symbolic meaning, as in crimes of passion [1–4].

However, the types of weapons used also vary in relation to perpetrator's socio-economic and environmental circumstances and to the current cultures. The literature reviewed shows that knives have always been the most common steel weapon used to commit murder, particularly kitchen and jack-knives, probably because of their easy availability. Less common, instead, is the use of other types of knives, scissors, and other objects used as stabbing and/or cutting weapons [5,6].

With regard to the identification of the sharp force, by studying the patterns of injuries it is possible to distinguish between knives with a single or double-edged blade, and to obtain information on whether the blade has a saw or corrugated edge [7] and/or the type of handle if the hilt has caused excoriated injuries in the case of penetrating wound [8].

We report a case where the peculiar and atypical characteristics of the wounds led us to suppose the use of a

particular type of knife belonging to the “survival-knives” category.

These knives are becoming more frequently used, not only by the categories they were intended for (explorers, soldiers, scuba divers, etc.), but also by persons influenced by what they stand for.

The literature on this subject is certainly scanty but the two cases recorded by us, where the use of a survival knife was ascertained, reinforced our conviction about the use of the same weapon in the case we present; indeed, the comparability of the characteristic injuries described is very clear [9,10].

### 2. The case

On the night of 27 July, the dead body of a young woman was found in a dirt field on the western outskirts of Rome, usually frequented by prostitutes. During the inspection it was noticed that the body (partially naked), had multiple sharp force injuries of the stab and cut type on the neck, chest, abdomen and upper limbs; a cut throat injury with patterned margins was particularly evident, as well as penetrating injuries to the chest.

When the on site inspection was completed, the corpse was moved to our institute for the post-mortem examination, during which it was confirmed that the woman had suffered multiple sharp force injuries.

- Four to the neck, which had cut the throat, with blows inflicted from left to right based on the entry and exit

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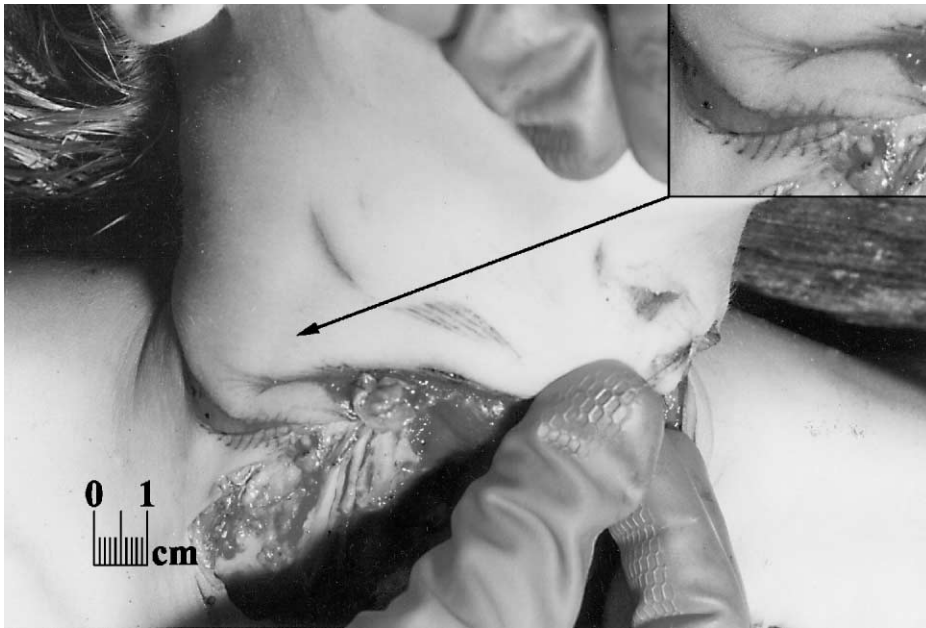


Fig. 1. The scrape marks on the neck.

orientation of the wounds; the injuries to the neck had scrape marks on the margins, consisting of linear, superficial and seriate excoriations, about 0.3 cm away from each other (Fig. 1).

- Many other more superficial injuries were observed on the remaining body, interpreted as the perpetrator's unsuccessful stab attempts; most of them were punctiform, while others had the same patterned appearance (Fig. 2).

- The victim had suffered nine other injuries, which were located on the chest and abdomen, with four wounds penetrating into the cavities (one to the chest, three to the abdomen); the remaining injuries stopped in the soft tissue of the wall of the thorax and abdomen, causing short lesions with a strong slant on the frontal plane. Of the penetrating wounds, the one of particular importance in demonstrating the use of a survival-knife was on the chest;

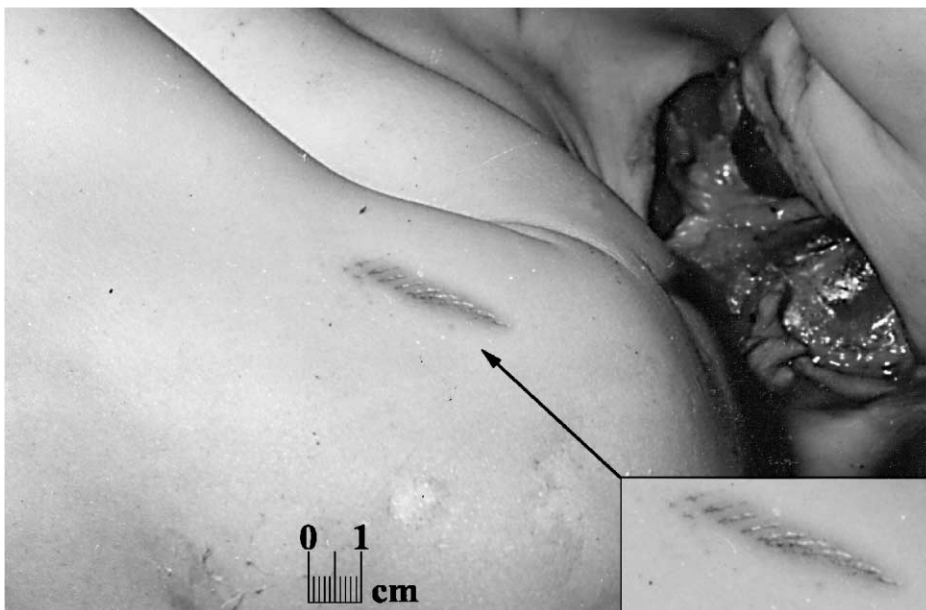


Fig. 2. The superficial injuries on the body.

it showed the patterned appearance of the wound on the skin (Fig. 3a) with the particular feature that the excoriations changed from linear to V-shaped, almost reproducing in the skin the mechanism of stabbing-withdrawing the weapon that could be observed on the thorax (detail).

- “Defence” wounds were found on both of the victim’s hands and these were also characterised by the presence, next to wounds, of punctiform excoriations, separated by a bridge of undamaged skin 0.3 cm wide, which could correspond to grabbing the saw edge of the knife (Fig. 4).

- Five ecchymotic areas were observed in the belly of the bicipital muscle of the left arm, indicating “grabbing” wounds inflicted on the victim by the perpetrator. There were also ecchymotic areas on the left upper and lower eyelids and on the right cheek.

The cause of death was determined to be acute haemorrhage resulting from the throat being cut and from the multiple visceral injuries caused by the penetrating wounds to the chest and abdomen with haemothorax and

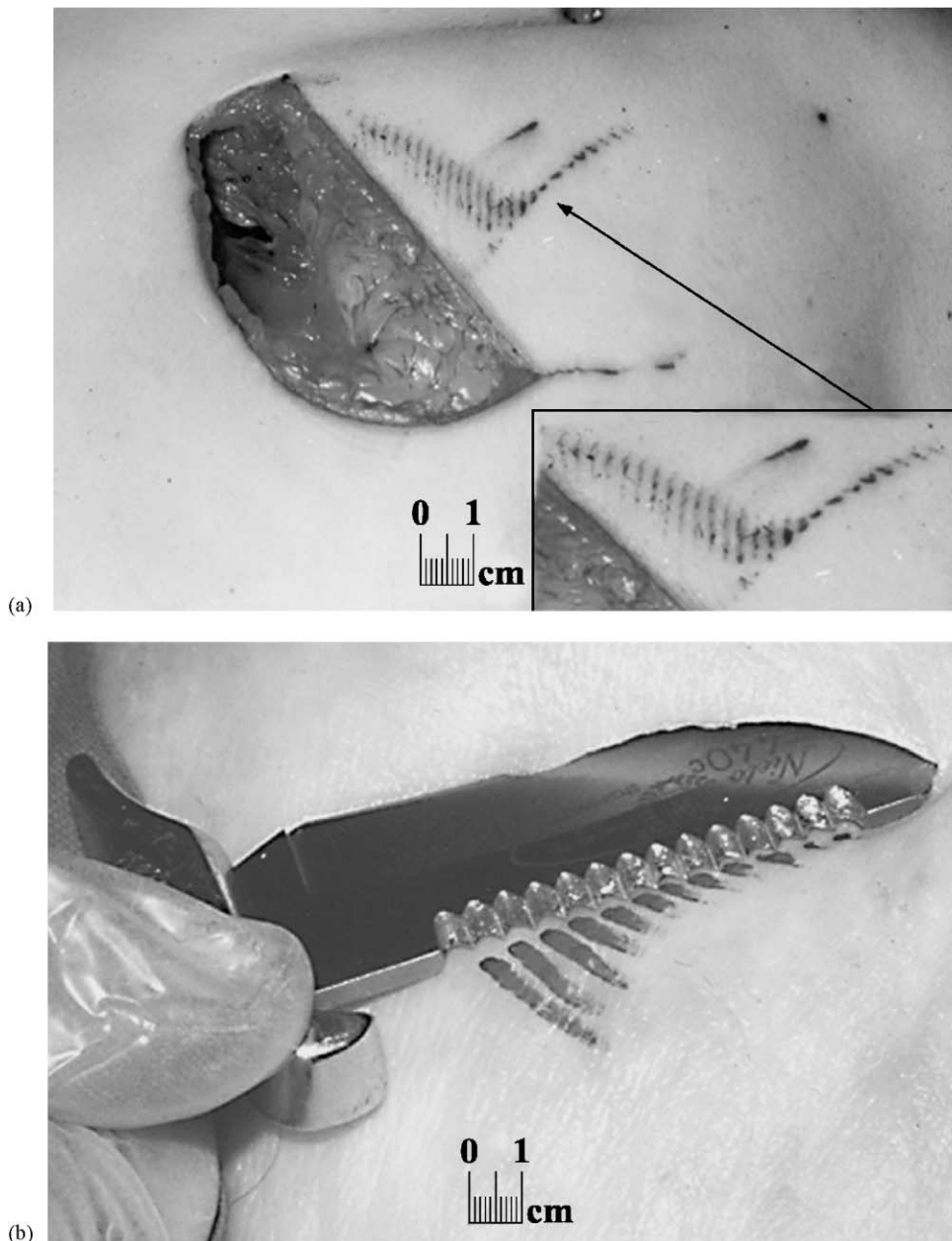


Fig. 3. (a) Stab wound on the chest; (b–d) experimental reproduction of the V-shaped wound.

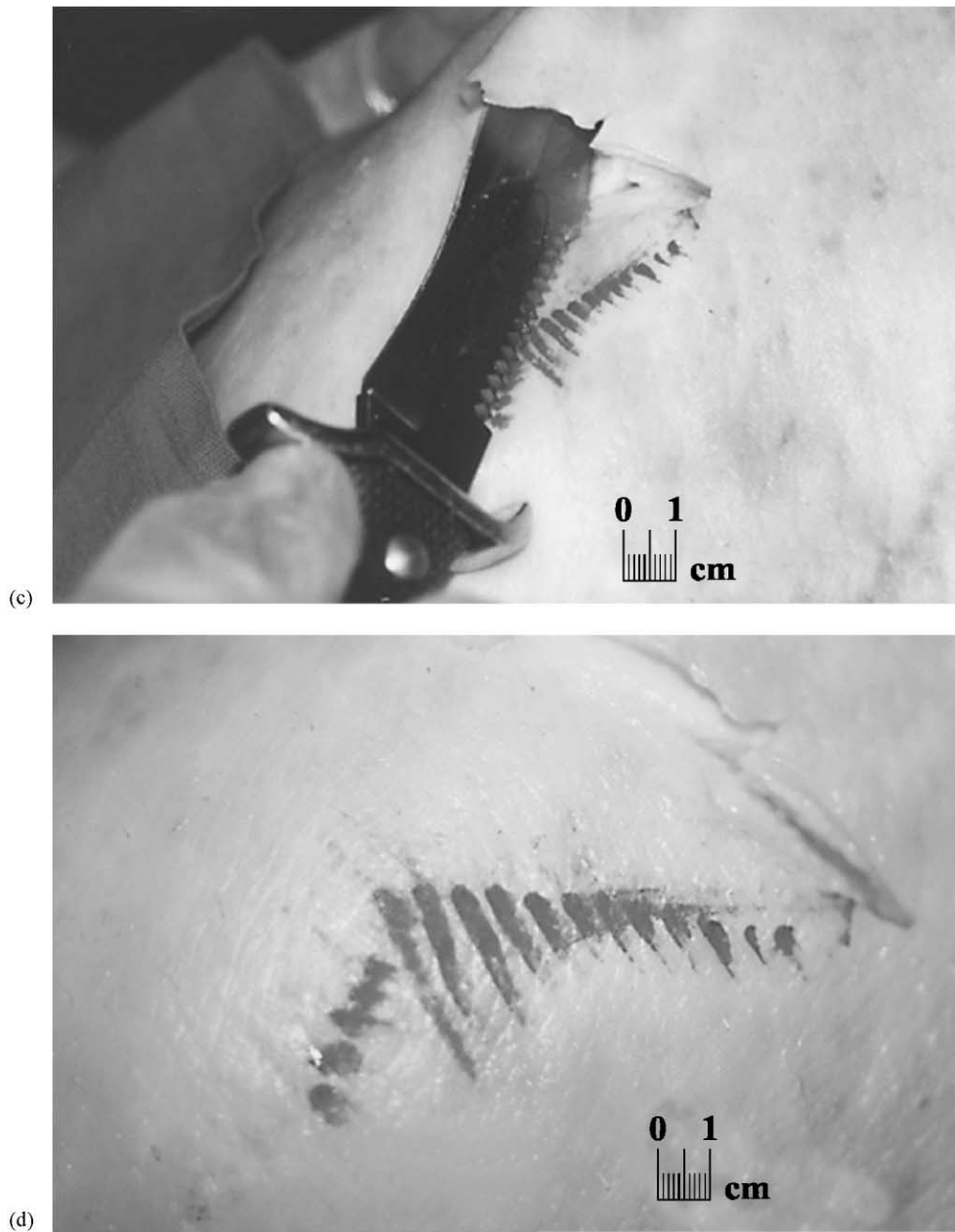


Fig. 3. (Continued).

haemoperitoneum. There was also aspiration of blood, partly due to the injuries to the main right bronchus but especially to the windpipe section: this finding led us to believe that the victim was still alive when she was stabbed in the neck.

Observation of the body during the inspection and the post-mortem examination showed numerous wounds inflicted with a steel weapon. Apart from the severest injuries to the neck, chest and abdomen, the many other more superficial wounds

to the body were interpreted as stabbing attempts and threats by the perpetrator.

This finding, combined with the fact that various parts of the body were involved, led us to think that victim was able to shift her position more than once, at the beginning of and partly during the assault, probably in an attempt to avoid the knife.

To further confirmation of this theory is provided by the “defence” wounds on the palms and fingers of both hands. As the literature shows, these injuries are always absent

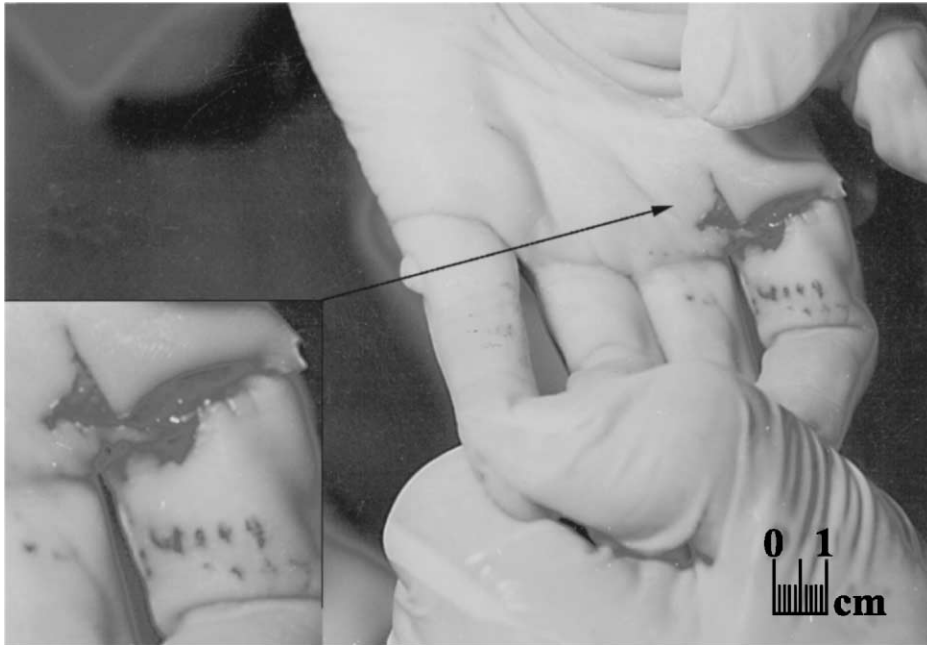


Fig. 4. Defence wounds: the saw edge marks.

when the attack occurs on a subject who has already been rendered inoffensive and when present they show that the victim is conscious, able to move and not completely taken by surprise by the perpetrator [11].

Moreover, the presence of ecchymoses on the face and forearm—showing the “grabbing” wounds inflicted on the victim by the perpetrator—led us to assume that the perpetrator grabbed the victim from behind, stabbing her over and over again in the chest and abdomen. The reconstruction of the wounds and of their slanting positions also backed up this assumption.

With regards to the severe cut throat injury, on the other hand, it was reasonable to presume that it was inflicted on the victim during the final phase or, in any case, after the other stabs to the chest and abdomen; even though the latter did not immediately cause mortal wounds they gradually rendered the victim inoffensive.

### 3. Discussion

In forensic pathology the need to provide indications about the weapon used to commit a specific crime is of primary importance. Among sharp force, in general, the possibility of identifying particular categories does not usually go beyond the limit of distinctions already mentioned (single- or double-edged knife; irregular edge, etc.).

In the case of survival-knives, on the contrary, the descriptions of the wounds makes it possible to direct investigations towards the weapon used, in view of the typical pattern of the marks, caused by the compression-slashing mechanisms

against the skin by the saw-edged surface, while the arm is being thrust.

The literature consulted also reports that experiments have been made on plastic and organic material to study the effect of saw edges; it has emerged from this experiments that excoriated slashes, similar to those described by us, are the result of cuts by a blade in an almost flat position or at least tangent on the body surface [9].

In fact, the patterned injuries described many times in the association with stab and cut wounds and, we repeat, basically consisting of excoriated, linear slashes, parallel to one another and equidistant, with a “herring-bone” pattern, should in our opinion be interpreted as marks left on the victim’s skin by the weapon.

In particular, the more tangential the stab direction is to the plane of the skin, the more the pattern will consist of linear excoriations, whereas in the case of a position perpendicular to the skin (as when the weapon is grabbed (Fig. 4) the saw edge of the blade causes punctiform excoriations, specular to the cutting edge, if it is on the back of the blade.

With regard to the thrust-withdrawal mechanism (Fig. 3a), on the other hand, the saw edge of the blade reproduces on the skin the movement necessary for the blade to penetrate into the chest and then be withdrawn, causing V-shaped wound.

As we have demonstrated by using organic material (fresh pork belly 5 cm thick), the wound represented is related to the chest wound above it and was made by the saw edge of the blade, which produced belong side of the V on the skin (characterised by more linear excoriations (Fig. 3b), while thrusting, whereas the other side of the V (characterised by shorter and curved excoriations; Fig. 3c) was produced as

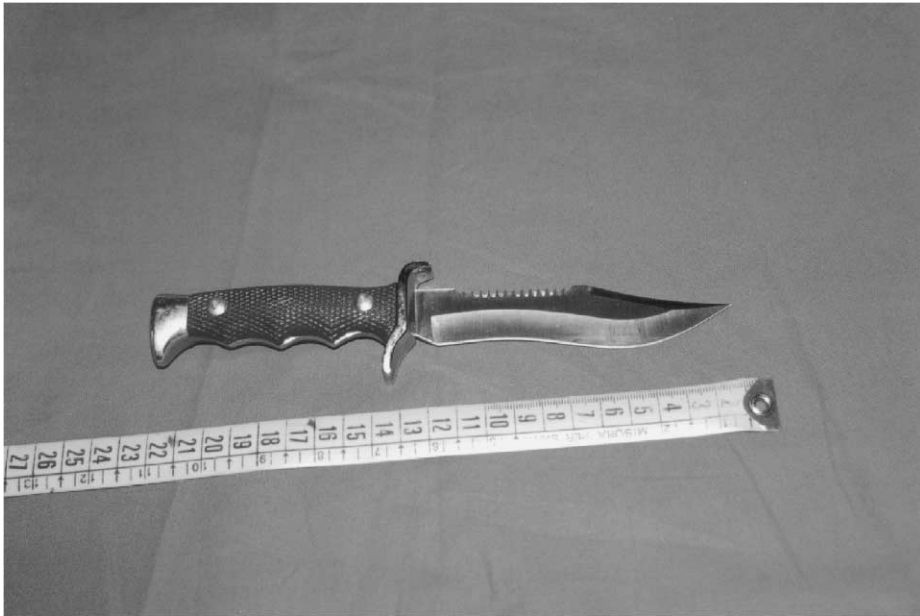


Fig. 5. A compatible weapon.

a result of the twisting movement during the successive withdrawal. The excoriations of the wound represented are highlighted in indelible ink on the experimental reproduction (Fig. 3d).

In view of the great variety of survival-knives on the market, it is possible to have different traumatic situations even with regard to the saw component (distance between each point, serration depth and blade thickness), but still the injuries have, on the whole, a characteristic appearance that allows a fairly accurate diagnosis of the sharp force used. Naturally, such patterned wounds can be more or less accentuated depending on the slanting direction of the thrusts in relation to the skin plane.

In fairly recent times survival-knives have become more and more common since when they appeared on the market to meet the needs of sports and hobbies (hunting, fishing, camping, touring, etc.). There are different types on sale, but their common characteristic is that they have knurled notches usually on the back of the knife but occasionally along the edge of the blade, which give the knife the third function of sawing in addition to stabbing and cutting. The saw edge on the back of the knife is usually very close to the handle (Fig. 5); this position explains why typical compression-slashing injuries to the skin can be observed in two cases.

- (a) In the case of deep thrust, when the saw edge comes in contact with the skin by invagination caused by penetration of the blade.
- (b) In the case of shallow wounds, when the weapon is used with the back directly against the skin.

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